

## Capstone Project

### Pharma Counterfeit Solution

There are 3 Steps to Completely setup the project

- A. Cryptogen files generation and Channel Artifacts Generation
- B. Chain code installation and initialisation.
- C. webAPI creation using Node and Node express to interact with Smart Contract

Note: The first line is the functionality, Second line is the Command to execute in Terminal

#### A. Setting up of Docker Network

- 1. Open Terminal, redirect the file path to where the project is setup**
- 2. Generate Cryptogen using the following command**

```
cryptogen generate --config=./crypto-config.yaml
```

```
Last login: Sat Dec 28 01:07:41 on ttys018
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
Binayrams-MacBook-Pro:~ binayramrajendra$ cd /Users/binayramrajendra/Desktop/Capstone/Network/
Binayrams-MacBook-Pro:Network binayramrajendra$ PATH=/Users/binayramrajendra/Desktop/Capstone/Network/bin:$PATH
Binayrams-MacBook-Pro:Network binayramrajendra$ cryptogen generate --config=./crypto-config.yaml
manufacturer.pharma-network.com
distributor.pharma-network.com
retailer.pharma-network.com
consumer.pharma-network.com
transporter.pharma-network.com
Binayrams-MacBook-Pro:Network binayramrajendra$ █
```

#### 3. Generating Channel Artifacts

- a. To generate channel artifacts first we need to create Directory for that the command is**

```
mkdir channel-artifacts
```

- b. Create genesis block using configuration file, in the network using the below command**

```
configtxgen -profile OrdererGenesis -channelID manufacturer-sys-channel
-outputBlock ./channel-artifacts/genesis.block
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ mkdir channel-artifacts
Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile OrdererGenesis -channelID manufacturer-sys-channel -outputBlock ./channel-artifacts/genesis.block
2019-12-28 14:17:57.000 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:17:57.024 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 002 orderer type: solo
2019-12-28 14:17:57.025 IST [common.tools.configtxgen.localconfig] Load -> INFO 003 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:17:57.045 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 004 orderer type: solo
2019-12-28 14:17:57.045 IST [common.tools.configtxgen.localconfig] loadTopLevel -> INFO 005 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:17:57.057 IST [common.tools.configtxgen] doOutputBlock -> INFO 006 Generating genesis block
2019-12-28 14:17:57.058 IST [common.tools.configtxgen] doOutputBlock -> INFO 007 Writing genesis block
Binayrams-MacBook-Pro:Network binayramrajendra$ █
```

- c. Create a channel using Configuration file**

```
configtxgen -profile PharmaChannel -outputCreateChannelTx ./channel-artifacts/channel.tx -channelID pharmachannel
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputCreateChannelTx ./channel-artifacts/channel.tx -channelID pharmachannel
2019-12-28 14:28:41.701 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:28:41.738 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:28:41.764 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2019-12-28 14:28:41.764 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:28:41.764 IST [common.tools.configtxgen] doOutputChannelCreateTx -> INFO 005 Generating new channel configtx
2019-12-28 14:28:41.764 IST [common.tools.configtxgen.encoder] NewChannelGroup -> WARN 006 Default policy emission is deprecated, please include policy specifications for the channel group in configtx.yaml
2019-12-28 14:28:41.769 IST [common.tools.configtxgen.encoder] NewChannelGroup -> WARN 007 Default policy emission is deprecated, please include policy specifications for the channel group in configtx.yaml
2019-12-28 14:28:41.774 IST [common.tools.configtxgen] doOutputChannelCreateTx -> INFO 008 Writing new channel tx
Binayrams-MacBook-Pro:Network binayramrajendra$
```

#### d. Configuration files for all the anchor peers in the network

- **Anchor update for manufacturer**

```
configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/manufacturerMSPanchors.tx -channelID pharmachannel -asOrg manufacturerMSP
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/manufacturerMSPanchors.tx -channelID pharmachannel -asOrg manufacturerMSP
2019-12-28 14:37:04.657 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:37:04.683 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:37:04.705 IST [common.tools.configtxgen.localconfig] completeInitialization -> INFO 003 orderer type: solo
2019-12-28 14:37:04.705 IST [common.tools.configtxgen.localconfig] LoadTopLevel -> INFO 004 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml
2019-12-28 14:37:04.705 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 005 Generating anchor peer update
2019-12-28 14:37:04.705 IST [common.tools.configtxgen] doOutputAnchorPeersUpdate -> INFO 006 Writing anchor peer update
Binayrams-MacBook-Pro:Network binayramrajendra$
```

- **Anchor update for Distributor**

```
configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/distributorMSPanchors.tx -channelID pharmachannel -asOrg distributorMSP
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/distributorMSPanchors.tx -channelID pharmachannel -asOrg distributorMSP
2019-12-28 14:43:54.355 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:43:54.374 IST [common.tools.configtxgen.localconfig] Loa
```

- **Anchor update for Retailer**

```
configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/retailerMSPanchors.tx -channelID pharmachannel -asOrg retailerMSP
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/retailerMSPanchors.tx -channelID pharmachannel -asOrg retailerMSP
2019-12-28 14:50:56.285 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:50:56.309 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml]
```

- **Anchor update for Transporter**

```
configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/transporterMSPanchors.tx -channelID pharmachannel -asOrg transporterMSP
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/transporterMSPanchors.tx -channelID pharmachannel -asOrg transporterMSP
2019-12-28 14:53:01.531 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:53:01.606 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml]
```

- **Anchor update for Consumer**

```
configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/consumerMSPanchors.tx -channelID pharmachannel -asOrg consumerMSP
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ configtxgen -profile PharmaChannel -outputAnchorPeersUpdate ./channel-artifacts/consumerMSPanchors.tx -channelID pharmachannel -asOrg consumerMSP
2019-12-28 14:54:06.076 IST [common.tools.configtxgen] main -> INFO 001 Loading configuration
2019-12-28 14:54:06.102 IST [common.tools.configtxgen.localconfig] Load -> INFO 002 Loaded configuration: /Users/binayramrajendra/Desktop/Capstone/Network/configtx.yaml]
```

- e. Starting Docker container

```
docker-compose -f ./docker-compose.yml up -d
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ docker-compose -f ./do
cker-compose.yml up -d
Creating network "network_pharma" with the default driver
Creating volume "network_orderer.pharma-network.com" with default driv
er
Creating volume "network_peer0.manufacturer.pharma-network.com" with d
efault driver
```

## F. Login to Cli Container

```
docker exec -it cli /bin/bash
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ docker exec -it cli /b
in/bash
root@1204beb0d995:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

## G. Creating Channel

```
peer channel create -o orderer.pharma-network.com:7050 -c pharmachannel
-f ./channel-artifacts/channel.tx
```

H. Attaching peers.

```
Binayrams-MacBook-Pro:Network binayramrajendra$ docker exec -it cli /bin/bash
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chann
el create -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artif
acts/channel.tx
2019-12-28 13:05:52.317 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and
orderer connections initialized
2019-12-28 13:05:52.476 UTC [cli.common] readBlock -> INFO 002 Received block: 0
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# ??
```

### • Joining Peer0 of Manufacturer

```
CORE_PEER_LOCALMSPID="manufacturerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/
peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/
Admin@manufacturer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="manufacturerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:14:11.995 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and
orderer connections initialized
2019-12-28 13:14:12.211 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

- **Joining peer1 of Manufacturer**

CORE\_PEER\_ADDRESS=peer1.manufacturer.pharma-network.com:8051

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer1.manufacturer.pharma-network.com:8051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:17:15.893 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and
orderer connections initialized
2019-12-28 13:17:15.975 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

- **Joining Peer0 of Distributor**

CORE\_PEER\_LOCALMSPID="distributorMSP"

CORE\_PEER\_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp

CORE\_PEER\_ADDRESS=peer0.distributor.pharma-network.com:9051

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="distributorMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.distributor.pharma-network.com:9051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:19:03.881 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and
orderer connections initialized
2019-12-28 13:19:03.940 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

- **Joining peer1 of Distributor**

```
CORE_PEER_ADDRESS=peer1.distributor.pharma-network.com:10051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER
[_ADDRESS=peer1.distributor.pharma-network.com:10051]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chan
nel join -b pharmachannel.block
2019-12-28 13:20:03.961 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser an
d orderer connections initialized
2019-12-28 13:20:04.020 UTC [channelCmd] executeJoin -> INFO 002 Successfully s
ubmitted proposal to join channel
```

- **Joining Peer0 of Retailer**

```
CORE_PEER_LOCALMSPID="retailerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/
peer/crypto/peerOrganizations/retailer.pharma-network.com/users/
Admin@retailer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.retailer.pharma-network.com:11051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER
_LOCALMSPID="retailerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER
_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOr
ganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com
/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER
_ADDRESS=peer0.retailer.pharma-network.com:11051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chan
nel join -b pharmachannel.block
2019-12-28 13:31:15.610 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser an
d orderer connections initialized
2019-12-28 13:31:15.685 UTC [channelCmd] executeJoin -> INFO 002 Successfully s
ubmitted proposal to join channel
```

- **Joining peer1 of Retailer**

```
CORE_PEER_ADDRESS=peer1.retailer.pharma-network.com:12051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer1.retailer.pharma-network.com:12051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:31:21.619 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:31:22.042 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

- **Joining Peer0 of Consumer**

```
CORE_PEER_LOCALMSPID="consumerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="consumerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:31:27.162 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:31:27.285 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

- **Joining peer1 of Consumer**

```
CORE_PEER_ADDRESS=peer1.consumer.pharma-network.com:14051
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer1.consumer.pharma-network.com:14051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:31:32.919 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:31:33.428 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

- **Attaching Peer0 of Transporter**

```
CORE_PEER_LOCALMSPID="transporterMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.transporter.pharma-network.com:15051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="transporterMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.transporter.pharma-network.com:15051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block

2019-12-28 13:31:41.889 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:31:42.073 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

- **Joining peer1 of Transporter**

```
CORE_PEER_ADDRESS=peer1.transporter.pharma-network.com:16051
```

```
peer channel join -b pharmachannel.block
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer1.transporter.pharma-network.com:16051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel join -b pharmachannel.block
2019-12-28 13:31:46.791 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:31:46.876 UTC [channelCmd] executeJoin -> INFO 002 Successfully submitted proposal to join channel
```

## I. Setting up of anchor peers

- **Attaching peer of Manufacturer**

```
CORE_PEER_LOCALMSPID="manufacturerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
```

```
peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel  
-f ./channel-artifacts/manufacturerMSPanchors.tx
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_LOCALMSPID="manufacturerMSP"  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOr  
ganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-net  
work.com/msp  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_ADDRESS=peer0.manufacturer.pharma-network.com:7051  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chan  
nel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-art  
ifacts/manufacturerMSPanchors.tx  
2019-12-28 13:31:59.007 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser an  
d orderer connections initialized  
2019-12-28 13:31:59.162 UTC [channelCmd] update -> INFO 002 Successfully submit  
ted channel update
```

- **Attaching peer of Distributor**

```
CORE_PEER_LOCALMSPID="distributorMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/  
peer/crypto/peerOrganizations/distributor.pharma-network.com/users/  
Admin@distributor.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.distributor.pharma-network.com:9051
```

```
peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel  
-f ./channel-artifacts/distributorMSPanchors.tx
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_LOCALMSPID="distributorMSP"  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOr  
ganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-netwo  
rk.com/msp  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER  
_ADDRESS=peer0.distributor.pharma-network.com:9051  
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chan  
nel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-art  
ifacts/distributorMSPanchors.tx  
2019-12-28 13:32:14.805 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser an  
d orderer connections initialized  
2019-12-28 13:32:15.460 UTC [channelCmd] update -> INFO 002 Successfully submit  
ted channel update
```

- **Attaching peer of Retailer**

```
CORE_PEER_LOCALMSPID="retailerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.retailer.pharma-network.com:11051
```

```
peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/retailerMSPanchors.tx
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="retailerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.retailer.pharma-network.com:11051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/retailerMSPanchors.tx
2019-12-28 13:32:24.432 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:32:24.947 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update
```

- **Attaching peer1 of Consumer**

```
CORE_PEER_LOCALMSPID="consumerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
```

```
peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/consumerMSPanchors.tx
```

```

root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="consumerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/consumerMSPanchors.tx

2019-12-28 13:32:34.202 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:32:35.042 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update

```

- **Attaching peer1 of Transporter**

CORE\_PEER\_LOCALMSPID="transporterMSP"

CORE\_PEER\_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp

CORE\_PEER\_ADDRESS=peer0.transporter.pharma-network.com:15051

peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/transporterMSPanchors.tx

```

root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="transporterMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.transporter.pharma-network.com:15051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer channel update -o orderer.pharma-network.com:7050 -c pharmachannel -f ./channel-artifacts/transporterMSPanchors.tx
2019-12-28 13:32:44.258 UTC [channelCmd] InitCmdFactory -> INFO 001 Endorser and orderer connections initialized
2019-12-28 13:32:45.497 UTC [channelCmd] update -> INFO 002 Successfully submitted channel update

```

## B.Chaincode installation and initialisation

### 1. Ssh Docker Chaincode

```
docker exec -it chaincode /bin/bash
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ docker exec -it chaincode /bin/
[bash
[root@98f4e23fb50:/opt/gopath/src/chaincode#
```

### 2. Install NPM packages

```
npm install
```

```
root@98f4e23fb50:/opt/gopath/src/chaincode# npm install
npm WARN phrmanet@0.0.1 No repository field.
npm WARN phrmanet@0.0.1 No license field.

audited 2820 packages in 27.59s

1 package is looking for funding.
Run "npm fund" to find out more.
```

### 3. Start npm

```
npm run start-dev
```

```
root@98f4e23fb50:/opt/gopath/src/chaincode# npm run start-dev

> phrmanet@0.0.1 start-dev /opt/gopath/src/chaincode
> fabric-chaincode-node start --peer.address peer0.manufacturer.pharma-network.
com:7053 --chaincode-id-name phrmanet:1.0

Configuring yargs through package.json is deprecated and will be removed in the
next major release, please use the JS API instead.
Configuring yargs through package.json is deprecated and will be removed in the
next major release, please use the JS API instead.
Configuring yargs through package.json is deprecated and will be removed in the
next major release, please use the JS API instead.
2019-12-28T13:37:56.148Z info [shim:contracts-spi/bootstrap.js]
  No metadata file supplied in contract, introspection will generate all the d
ata
2019-12-28T13:37:56.153Z info [shim:contracts-spi/chaincodefromcontract.js]
  Using serializers {"transaction":"jsonSerializer","serializers":{}}
Configuring yargs through package.json is deprecated and will be removed in the
next major release, please use the JS API instead.
2019-12-28T13:37:56.241Z info [shim:lib/chaincode.js]
  Registering with peer peer0.manufacturer.pharma-network.com:7053 as chaincod
e "phrmanet:1.0"

Command succeeded

2019-12-28T13:37:56.301Z info [shim:lib/handler.js]
  Successfully registered with peer node. State transferred to "established"
2019-12-28T13:37:56.305Z info [shim:lib/handler.js]
  Successfully established communication with peer node. State transferred to
"ready"
```

#### 4. Now we need to install the smart contract in chain code

- Log in to the CLI Container

```
docker exec -it cli /bin/bash
```

```
Binayrams-MacBook-Pro:Network binayramrajendra$ docker exec -it cli /bin/bash
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

- Installing smart contract to each peer

##### I. Chaincode installation in peer0 of Manufacturer

```
CORE_PEER_LOCALMSPID="manufacturerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
```

```
peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="manufacturerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
2019-12-28 13:38:27.665 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
2019-12-28 13:38:27.666 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
2019-12-28 13:39:12.979 UTC [chaincodeCmd] install -> INFO 003 Installed remote response:<status:200 payload:"OK" >
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

##### II. Chaincode installation in peer0 of Distributor

```
CORE_PEER_LOCALMSPID="distributorMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.distributor.pharma-network.com:9051
```

```
peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="distributorMSP"
[redacted]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/distributor.pharma-network.com/users/Admin@distributor.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.distributor.pharma-network.com:9051
[redacted]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
2019-12-28 13:39:18.004 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
[redacted]
2019-12-28 13:39:18.004 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
2019-12-28 13:39:59.933 UTC [chaincodeCmd] install -> INFO 003 Installed remote reply response:<status:200 payload:"OK" >
```

### III. Chaincode installation in peer0 of Retailer

```
CORE_PEER_LOCALMSPID="retailerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.retailer.pharma-network.com:11051
```

```
peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="retailerMSP"
[redacted]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/retailer.pharma-network.com/users/Admin@retailer.pharma-network.com/msp
[redacted]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.retailer.pharma-network.com:11051
[redacted]
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
2019-12-28 13:40:03.633 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
[redacted]
2019-12-28 13:40:03.633 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
2019-12-28 13:40:45.714 UTC [chaincodeCmd] install -> INFO 003 Installed remote reply response:<status:200 payload:"OK" >
```

#### **IV. Chaincode installation in peer0 of Consumer**

```
CORE_PEER_LOCALMSPID="consumerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
```

```
peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="consumerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/consumer.pharma-network.com/users/Admin@consumer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.consumer.pharma-network.com:13051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
2019-12-28 13:40:54.694 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001
Using default escc
2019-12-28 13:40:54.694 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002
Using default vscc
2019-12-28 13:41:47.768 UTC [chaincodeCmd] install -> INFO 003 Installed remote
ly response:<status:200 payload:"OK" >
```

#### **V. Chaincode installation in peer0 of Transporter**

```
CORE_PEER_LOCALMSPID="transporterMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.transporter.pharma-network.com:15051
```

```
peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
```

```

root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="transporterMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/transporter.pharma-network.com/users/Admin@transporter.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.transporter.pharma-network.com:15051
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode install -n pharmanet -v 1.0 -l node -p /opt/gopath/src/github.com/hyperledger/fabric/peer/chaincode/
2019-12-28 13:41:54.138 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
2019-12-28 13:41:54.139 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
2019-12-28 13:42:40.010 UTC [chaincodeCmd] install -> INFO 003 Installed remote response:<status:200 payload:"OK" >

```

- Instantiating smart contract

## I. Log in to the CLI Container

```
docker exec -it cli /bin/bash
```

```
[Binayrams-MacBook-Pro:Network binayramrajendra$ docker exec -it cli /bin/bash ]
[root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="manufacturerMSP"
```

## II. Select the Peer where instantiation needs to be done, in this case we have selected Manufacturer

```
CORE_PEER_LOCALMSPID="manufacturerMSP"
```

```
CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
```

```
CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051
```

```
[root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_LOCALMSPID="manufacturerMSP"
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_MSPCONFIGPATH=/opt/gopath/src/github.com/hyperledger/fabric/peer/crypto/peerOrganizations/manufacturer.pharma-network.com/users/Admin@manufacturer.pharma-network.com/msp
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# CORE_PEER_ADDRESS=peer0.manufacturer.pharma-network.com:7051]
```

### **III.Instantiating the chain code**

```
peer chaincode instantiate -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -l node -v 1.0 -c '{"Args":["org.pharma-network.pharmanet:instantiate"]}' -P "OR ('manufacturerMSP.member','distributorMSP.member','retailerMSP.member','consumerMSP.member','transporterMSP.member')"
```

```
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer# peer chaincode instantiate -o orderer.pharma-network.com:7050 -C pharmachannel -n pharmanet -l node -v 1.0 -c '{"Args":["org.pharma-network.pharmanet:instantiate"]}' -P "OR ('manufacturerMSP.member','distributorMSP.member','retailerMSP.member','consumerMSP.member','transporterMSP.member')"
2019-12-28 13:43:15.533 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 001 Using default escc
2019-12-28 13:43:15.536 UTC [chaincodeCmd] checkChaincodeCmdParams -> INFO 002 Using default vscc
root@f430a9917e14:/opt/gopath/src/github.com/hyperledger/fabric/peer#
```

## C. Application using Node and Node express to interact with Smart Contract

### 1. Change the path for Application folder

- For manufacturer Application

#### I. Path Change for manufacturer Application

```
cd ../Application/manufacturer-application/
```

```
|Binayrams-MacBook-Pro:Network binayramrajendra$ cd ../Application/manufacturer-application/
|Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ |
```

#### II. Installing NPM dependencies

```
npm install
```

```
|Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ npm install
|npm WARN pharma_network@1.0.0 No repository field.
|npm WARN pharma_network@1.0.0 No license field.

audited 2186 packages in 3.372s

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

#### III. Node express port listening

```
node.
```

```
|Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ node .
|Distributed Pharma Manufacturer App listening on port 1000!
| |
```

- For Distributor Application

#### I. Path Change for Distributor Application

```
cd ../distributor-application/
```

```
|Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ cd ../distributor-application/
|Binayrams-MacBook-Pro:distributor-application binayramrajendra$ |
```

#### II. Installing NPM dependencies

```
npm install
```

```
[Binayrams-MacBook-Pro:distributor-application binayramrajendra$ npm install
npm WARN pharma_network@1.0.0 No repository field.
npm WARN pharma_network@1.0.0 No license field.

audited 2186 packages in 3.578s

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Binayrams-MacBook-Pro:distributor-application binayramrajendra$ ]
```

### III. Node express port listening

node.

```
[Binayrams-MacBook-Pro:distributor-application binayramrajendra$ node .
Distributed Pharma Distributor App listening on port 2000!
[
```

### • For Retailer Application

#### I.Path Change for Retailer Application

```
cd ../retailer-application/
```

```
[Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ cd ../retailer-application/
[Binayrams-MacBook-Pro:retailer-application binayramrajendra$ ]
```

### II. Installing NPM dependencies

```
npm install
```

```
[Binayrams-MacBook-Pro:retailer-application binayramrajendra$ npm i
npm WARN pharma_network@1.0.0 No repository field.
npm WARN pharma_network@1.0.0 No license field.

audited 2184 packages in 3.263s

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

III. Node express port listening

Node.

```
[Binayrams-MacBook-Pro:retailer-application binayramrajendra$ node .
Distributed Pharma Retailer App listening on port 3000!
```

- **For Transporter Application**

#### I.Path Change for Transporter Application

```
cd ../transporter-application/
```

```
Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ cd ../transporter-application/
Binayrams-MacBook-Pro:transporter-application binayramrajendra$
```

#### II. Installing NPM dependencies

```
npm install
```

```
[Binayrams-MacBook-Pro:transporter-application binayramrajendra$ npm i
npm WARN pharma_network@1.0.0 No repository field.
npm WARN pharma_network@1.0.0 No license field.

audited 2184 packages in 2.949s

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

Binayrams-MacBook-Pro:transporter-application binayramrajendra$
```

#### III. Node express port listening

Node.

```
[Binayrams-MacBook-Pro:transporter-application binayramrajendra$ node .
Distributed Pharma Transporter App listening on port 4000!
```

- **For Consumer Application**

### I.Path Change for Consumer Application

```
cd ../consumer-application/
```

```
[Binayrams-MacBook-Pro:manufacturer-application binayramrajendra$ cd ../consumer-application/
```

### II. Installing NPM dependencies

```
npm install
```

```
[Binayrams-MacBook-Pro:consumer-application binayramrajendra$ npm i
npm WARN pharma_network@1.0.0 No repository field.
npm WARN pharma_network@1.0.0 No license field.

audited 2185 packages in 3.453s

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

[Binayrams-MacBook-Pro:consumer-application binayramrajendra$
```

### III. Node express port listening

Node.

```
[Binayrams-MacBook-Pro:consumer-application binayramrajendra$ node .
Distributed Pharma Consumer App listening on port 5000!
```

Now Nodes of all the app are listening

## Postman Request/Response

**Note: Before invoking any of these functions I have already Added Wallet functionality in the application, Execute that first to make sure that all the functionality works fine**

### 1. Create a manufacturer

The screenshot shows the Postman interface with a successful API call. The request details are as follows:

- Method:** POST
- URL:** localhost:1000/registerCompany
- Body (x-www-form-urlencoded):**

KEY	VALUE	DESCRIPTION
companyCRN	MAN001	
companyName	Sun Pharma	
location	Chennai	
organisationRole	Manufacturer	
Key	Value	Description

- Response Body (Pretty JSON):**

```
1 [ { "status": "success", "message": "Manufacturer added to Network", "data": { "companyID": "org.pharma-network.com.pharmasupplychain.registerMAN001Sun Pharma", "companyName": "Sun Pharma", "location": "Chennai", "organisationRole": "Manufacturer", "hierarchy": 1 } } ]
```

## 2. Create a transporter

The screenshot shows the Postman application interface. At the top, there are two tabs: "POST Create a manufacturer" and "POST Create a transporter". The "Create a transporter" tab is active. The URL in the header is "localhost:4000/registerCompany". On the right side, there are buttons for "Send" and "Save". Below the header, there are tabs for "Params", "Authorization", "Headers (9)", "Body" (which is selected), "Pre-request Script", "Tests", and "Settings". Under the "Body" tab, there are options: "none", "form-data", "x-www-form-urlencoded" (which is selected), "raw", "binary", and "GraphQL BETA". The "Body" section contains a table with columns "KEY", "VALUE", and "DESCRIPTION". The rows are:

KEY	VALUE	DESCRIPTION
companyCRN	TRA001	
companyName	FedEx	
location	Delhi	
organisationRole	Transporter	

Below the table, there are "Key" and "Value" fields. The "Value" field is empty. To the right, there are "Description" and "Bulk Edit" buttons. At the bottom of the "Body" tab, there are buttons for "Pretty", "Raw", "Preview", "Visualize BETA", and "JSON". The status bar at the bottom right shows "Status: 200 OK", "Time: 3.64s", "Size: 504 B", and "Save Response".

```
1 [{"status": "success", "message": "Transporter added to Network", "data": {"companyID": "org.pharma-network.com.pharmasupplychain.register@TRA001@FedEx@", "companyName": "FedEx", "location": "Delhi", "organisationRole": "Transporter", "hierarchy": ""}}]
```

### 3. Create another transporter – BlueDart

The screenshot shows the Postman application interface. At the top, there are three tabs: "POST Create a manufacturer", "POST Create a transporter fedex", and "POST Create a transporter Bluedart" (which is currently active). The header bar also shows "No Environment". Below the tabs, the URL is set to "localhost:4000/registerCompany". On the right side of the header, there are buttons for "Comments (0)", "Examples (0)", "Send", and "Save". Under the URL, there are tabs for "Params", "Authorization", "Headers (9)", "Body" (which is selected), "Pre-request Script", "Tests", and "Settings". The "Body" tab has a dropdown menu with options: "none", "form-data", "x-www-form-urlencoded" (selected), "raw", "binary", and "GraphQL BETA". The "Body" section contains a table with four columns: KEY, VALUE, DESCRIPTION, and actions. The table rows are:

KEY	VALUE	DESCRIPTION	Actions
<input checked="" type="checkbox"/> companyCRN	TRA002		...
<input checked="" type="checkbox"/> companyName	Blue Dart		
<input checked="" type="checkbox"/> location	Bangalore		
<input checked="" type="checkbox"/> organisationRole	Transporter		
Key	Value	Description	

Below the table, there are tabs for "Body", "Cookies", "Headers (7)", and "Test Results". The "Body" tab is selected. To the right, status information is displayed: "Status: 200 OK", "Time: 2.43s", "Size: 516 B", and a "Save Response" button. The main content area shows the JSON response in "Pretty" format:

```
1 {
2     "status": "success",
3     "message": "Transporter added to Network",
4     "data": {
5         "companyID": "org.pharma-network.com.pharmasupplychain.register@TRA002@Blue Dart",
6         "companyName": "Blue Dart",
7         "location": "Bangalore",
8         "organisationRole": "Transporter",
9         "hierarchy": ""
10    }
11 }
```

## 4. Create Distributor

The screenshot shows the Postman application interface. At the top, there are four tabs: "POST Create a manufacturer", "POST Create a transporter f...", "POST Create a transporter B...", and "POST Create a distributor". The fourth tab is highlighted with an orange border. To the right of the tabs are buttons for "No Environment", "Send", "Save", "Comments (0)", and "Examples (0)". Below the tabs, the URL "localhost:2000/registerCompany" is entered in the address bar, and the "Send" button is highlighted.

The main workspace has tabs for "Params", "Authorization", "Headers (9)", "Body", "Pre-request Script", "Tests", and "Settings". The "Body" tab is selected and highlighted with a green dot. It shows the following form data:

KEY	VALUE	DESCRIPTION
companyCRN	DIST001	
companyName	VG Pharma	
location	Vizag	
organisationRole	Distributor	
Key	Value	Description

Below the table, there are tabs for "Body", "Cookies", "Headers (7)", and "Test Results". The "Body" tab is selected. On the right, status information is displayed: "Status: 200 OK", "Time: 2.92s", "Size: 512 B", and "Save Response".

The "Body" section contains a JSON response:

```
1 [ { 2 "status": "success", 3 "message": "Distributor added to Network", 4 "data": { 5 "companyID": "org.pharma-network.com.pharmasupplychain.registerDIST001VG Pharma", 6 "companyName": "VG Pharma", 7 "location": "Vizag", 8 "organisationRole": "Distributor", 9 "hierarchy": 2 10 } 11 } ]
```

## 5. Create Retailer

The screenshot shows the Postman application interface. At the top, there are several tabs for different API endpoints, with the 'POST Create a retailer' tab being active. The URL in the header is 'localhost:3000/registerCompany'. Below the header, there are tabs for 'Params', 'Authorization', 'Headers (9)', 'Body (1)', 'Pre-request Script', 'Tests', and 'Settings'. The 'Body' tab is selected, showing a table with four rows: 'companyCRN' (value: RET002), 'companyName' (value: upgrad), 'location' (value: Mumbai), and 'organisationRole' (value: Retailer). There is also a 'Key' row with a 'Value' column. Below the table, there are tabs for 'Body', 'Cookies', 'Headers (7)', and 'Test Results'. The 'Body' tab is selected, showing a JSON response. The response is displayed in a code editor-like format with line numbers from 1 to 11. The JSON content is:

```
1 {
2     "status": "success",
3     "message": "Retailer added to Network",
4     "data": {
5         "companyID": "org.pharma-network.com.pharmasupplychain.registerRET002upgrad",
6         "companyName": "upgrad",
7         "location": "Mumbai",
8         "organisationRole": "Retailer",
9         "hierarchy": 3
10    }
11 }
```

At the bottom right of the body panel, there are status indicators: 'Status: 200 OK', 'Time: 2.67s', 'Size: 499 B', and a 'Save Response' button.

## 6. Add Drugs

001

The screenshot shows the Postman interface with a successful API call to add a drug. The request details are as follows:

- Method: POST
- URL: localhost:1000/addDrug
- Body (x-www-form-urlencoded):
  - drugName: Paracetamol
  - serialNo: 001
  - mfgDate: Jan-2020
  - expDate: Dec-2020
  - companyCRN: MAN001

The response body is:

```
1
2   "status": "success",
3   "message": "Add new Drug request submitted on the Network",
4   "data": {
5     "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@001@",
6     "name": "Paracetamol",
7     "manufacturer": "org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma@",
8     "mfgDate": "Jan-2020",
9     "expDate": "Dec-2020",
10    "owner": "MAN001",
11    "shipment": null
12  }
```

002

The screenshot shows the Postman interface with a successful API call to add another drug. The request details are as follows:

- Method: POST
- URL: localhost:1000/addDrug
- Body (x-www-form-urlencoded):
  - drugName: Paracetamol
  - serialNo: 002
  - mfgDate: Jan-2020
  - expDate: Dec-2020
  - companyCRN: MAN001

The response body is:

```
1
2   "status": "success",
3   "message": "Add new Drug request submitted on the Network",
4   "data": {
5     "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@002@",
6     "name": "Paracetamol",
7     "manufacturer": "org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma@",
8     "mfgDate": "Jan-2020",
9     "expDate": "Dec-2020",
10    "owner": "MAN001",
11    "shipment": null
12  }
```

003

The screenshot shows the Postman interface with a successful API call. The URL is `localhost:1000/addDrug`. The request method is `POST`. The body is set to `x-www-form-urlencoded` and contains the following data:

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	003	
mfgDate	Jan-2020	
expDate	Dec-2020	
companyCRN	MAN001	
Key	Value	Description

The response status is `200 OK`, time `2.47s`, and size `637 B`. The response body is:

```
1 {
2     "status": "success",
3     "message": "Add new Drug request submitted on the Network",
4     "data": {
5         "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@003@",
6         "name": "Paracetamol",
7         "manufacturer": "org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma",
8         "mfgDate": "Jan-2020",
9         "expDate": "Dec-2020",
10        "owner": "MAN001",
11        "shipment": null
12    }
13 }
```

004

The screenshot shows the Postman interface with a successful API call. The URL is `localhost:1000/addDrug`. The request method is `POST`. The body is set to `x-www-form-urlencoded` and contains the following data:

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	004	
mfgDate	Jan-2020	
expDate	Dec-2020	
companyCRN	MAN001	
Key	Value	Description

The response status is `200 OK`, time `2.40s`, and size `637 B`. The response body is:

```
1 {
2     "status": "success",
3     "message": "Add new Drug request submitted on the Network",
4     "data": {
5         "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@004@",
6         "name": "Paracetamol",
7         "manufacturer": "org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma",
8         "mfgDate": "Jan-2020",
9         "expDate": "Dec-2020",
10        "owner": "MAN001",
11        "shipment": null
12    }
13 }
```

## Supply Chain

1. Purchase Order raised by 'VG Pharma' to purchase 3 strips of paracetamol from 'Sun Pharma'

The screenshot shows the Postman application interface. At the top, there is a header bar with several 'POST ...' buttons and a dropdown menu set to 'No Environment'. Below the header, a title bar reads 'Purchase Order raised by 'VG Pharma' to purchase 3 strips of paracetamol from 'Sun Pharma''. To the right of the title are 'Comments (0)', 'Examples (0)', and a gear icon. The main workspace is a POST request to 'localhost:2000/createPO'. The 'Body' tab is selected, showing a form-data payload with the following fields:

KEY	VALUE	DESCRIPTION
buyerCRN	DIST001	
sellerCRN	MAN001	
drugName	paracetamol	
quantity	3	
Key	Value	Description

Below the body, there are tabs for 'Cookies', 'Headers (7)', and 'Test Results'. On the right side of the interface, status information is displayed: 'Status: 200 OK', 'Time: 3.60s', 'Size: 678 B', and a 'Save Response' button.

At the bottom of the interface, there is a code editor window showing the JSON response received:

```
1 [ { "status": "success", "message": "Add new PO request submitted on the Network", "data": { "poID": "org.pharma-network.com.pharmasupplychain.purchaseOrder@DIST001@paracetamol", "drugName": "paracetamol", "quantity": "3", "buyer": "org.pharma-network.com.pharmasupplychain.register@DIST001@VG Pharma", "seller": "org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma" } } ]
```

2. Shipment created by ‘Sun Pharma’ in response to the raised purchase order. ‘FedEx’ acts as the transporter.

The screenshot shows the Postman application interface. At the top, there is a toolbar with various buttons for different HTTP methods (POST, GET, PUT, DELETE) and other actions like 'No Environment'. Below the toolbar, a status bar displays the message: 'Shipment created by 'Sun Pharma' in response to the raised purchase order. 'FedEx' acts as the transporter.' To the right of the status bar are 'Comments (0)', 'Examples (0)', and settings icons.

The main workspace is a POST request configuration window. The URL is set to 'localhost:1000/createShipment'. The 'Body' tab is selected, showing a table with four rows of data:

KEY	VALUE	DESCRIPTION	...	Bulk Edit
buyerCRN	DIST001			
drugName	Paracetamol			
listOfAssets	001 002 003			

Below the table, there is a section for 'Key' and 'Value' with a 'Description' field. At the bottom of the body panel, there are tabs for 'Pretty', 'Raw', 'Preview', 'Visualize BETA', and 'JSON'. The 'JSON' tab is selected, showing the following JSON response:

```
1  {
2      "status": "success",
3      "message": "Shipment request submitted on the Network",
4      "data": {
5          "shipmentID": "org.pharma-network.com.pharmasupplychain.shipment@DIST001@Paracetamol@",
6          "creator": "DIST001",
7          "assets": [
8              "001",
9              "002",
10             "003"
11         ],
12         "transporter": "org.pharma-network.com.pharmasupplychain.register@TRA001@FedEx@",
13         "status": "in-transit"
14     }
15 }
```

At the bottom right of the JSON panel, there are buttons for 'Save Response' and a 'Copy' icon. The status bar at the bottom of the screen shows 'Status: 200 OK', 'Time: 8.79s', 'Size: 608 B', and a 'Save Response' button.

### 3. 'FedEx' delivers the shipment to 'VG pharma'.

The screenshot shows the Postman application interface. At the top, there is a toolbar with various buttons for different HTTP methods (POST C, POST A, POST F, POST S, POST L) and other functions like 'No Environment'. Below the toolbar, a header bar displays the URL 'localhost:4000/updateShipment' and includes 'Comments (0)', 'Examples (0)', 'Send', and 'Save' buttons. The main workspace is divided into sections: 'Params', 'Authorization', 'Headers (9)', 'Body' (which is currently selected), 'Pre-request Script', 'Tests', and 'Settings'. Under 'Body', the 'x-www-form-urlencoded' tab is selected, showing three key-value pairs: 'buyerCRN' (value: DIST001), 'drugName' (value: Paracetamol), and 'transporterCRN' (value: TRA001). Below this, there is a table with columns 'Key', 'Value', 'Description', and 'Bulk Edit'. The status bar at the bottom indicates a '200 OK' response with a time of 3.92s and a size of 614 B.

Body (9)

Params Authorization Headers (9) Body **x-www-form-urlencoded** Pre-request Script Tests Settings Cookies Code

buyerCRN DIST001

drugName Paracetamol

transporterCRN TRA001

Key	Value	Description	...	Bulk Edit
Key	Value	Description		

Status: 200 OK Time: 3.92s Size: 614 B Save Response

Pretty Raw Preview Visualize **BETA** JSON

```
1 {
2     "status": "success",
3     "message": "Shippment update request submitted on the Network",
4     "data": {
5         "shipmentID": "org.pharma-network.com.pharmasupplychain.shipment@DIST001@Paracetamol@",
6         "creator": "TRA001",
7         "assets": [
8             "001",
9             "002",
10            "003"
11        ],
12        "transporter": "org.pharma-network.com.pharmasupplychain.register@TRA001@FedEx@",
13        "status": "delivered"
14    }
15 }
```

#### 4. Purchase Order raised by ‘upgrad’ to purchase 2 strips of paracetamol from ‘VG Pharma’.

The screenshot shows the Postman application interface. At the top, there is a toolbar with various buttons for different HTTP methods (POST A, POST A, POST A, POST P, POST S, POST F, POST SX, POST TE) and other functions (No Environment, Comments (0), Examples (0)). Below the toolbar, a message states: "Shipment created by 'VG Pharma' in response to the raised purchase order. 'Blue Dart' acts as the transporter." The main area shows a POST request to "localhost:2000/createShipment". The "Body" tab is selected, displaying a table with four rows of data:

KEY	VALUE	DESCRIPTION	...	Bulk Edit
<input checked="" type="checkbox"/> buyerCRN	RET002			
<input checked="" type="checkbox"/> drugName	Paracetamol			
<input checked="" type="checkbox"/> listOfAssets	001 002			

Below the table, there is a "Description" section with a "Key" column and a "Value" column. At the bottom of the "Body" tab, there are tabs for "Pretty", "Raw", "Preview", "Visualize BETA", and "JSON". The "JSON" tab is selected, showing the following JSON response:

```
1 [ { "status": "success", "message": "Shipment request submitted on the Network", "data": { "shipmentID": "org.pharma-network.com.pharmasupplychain.shipment@RET002@Paracetamol", "creator": "RET002", "assets": [ "001", "002" ], "transporter": "org.pharma-network.com.pharmasupplychain.register@TRA002@Blue Dart", "status": "in-transit" } } ]
```

On the right side of the JSON preview, there are icons for copy, search, and refresh. At the bottom right of the main interface, it says "Status: 200 OK Time: 4.09s Size: 604 B Save Response".

## 5. 'Blue Dart' delivers the shipment to 'upgrad'.

The screenshot shows the Postman application interface. At the top, there is a header bar with various buttons for different HTTP methods (POST A, POST A, POST A, POST F, POST S, POST F, POST S, POST T) and a dropdown for 'No Environment'. Below the header, a note says '▶ 'Blue Dart' delivers the shipment to 'upgrad''. The main area shows a 'POST' request to 'localhost:4000/updateShipment'. The 'Body' tab is selected, showing a table with three rows: 'buyerCRN' (value: RET002), 'drugName' (value: Paracetamol), and 'transporterCRN' (value: TRA002). Below the table, there is a 'Pretty' JSON view of the response body:

```
1  {
2      "status": "success",
3      "message": "Shippment update request submitted on the Network",
4      "data": {
5          "shipmentID": "org.pharma-network.com.pharmasupplychain.shipment@RET002@Paracetamol@",
6          "creator": "TRA002",
7          "assets": [
8              "001",
9              "002"
10         ],
11         "transporter": "org.pharma-network.com.pharmasupplychain.register@TRA002@Blue Dart@",
12         "status": "delivered"
13     }
14 }
```

The status bar at the bottom indicates 'Status: 200 OK' and 'Time: 4.59s'.

6. A customer named ‘Akash’ buys 1 paracetamol strip from the retailer ‘upgrad’.

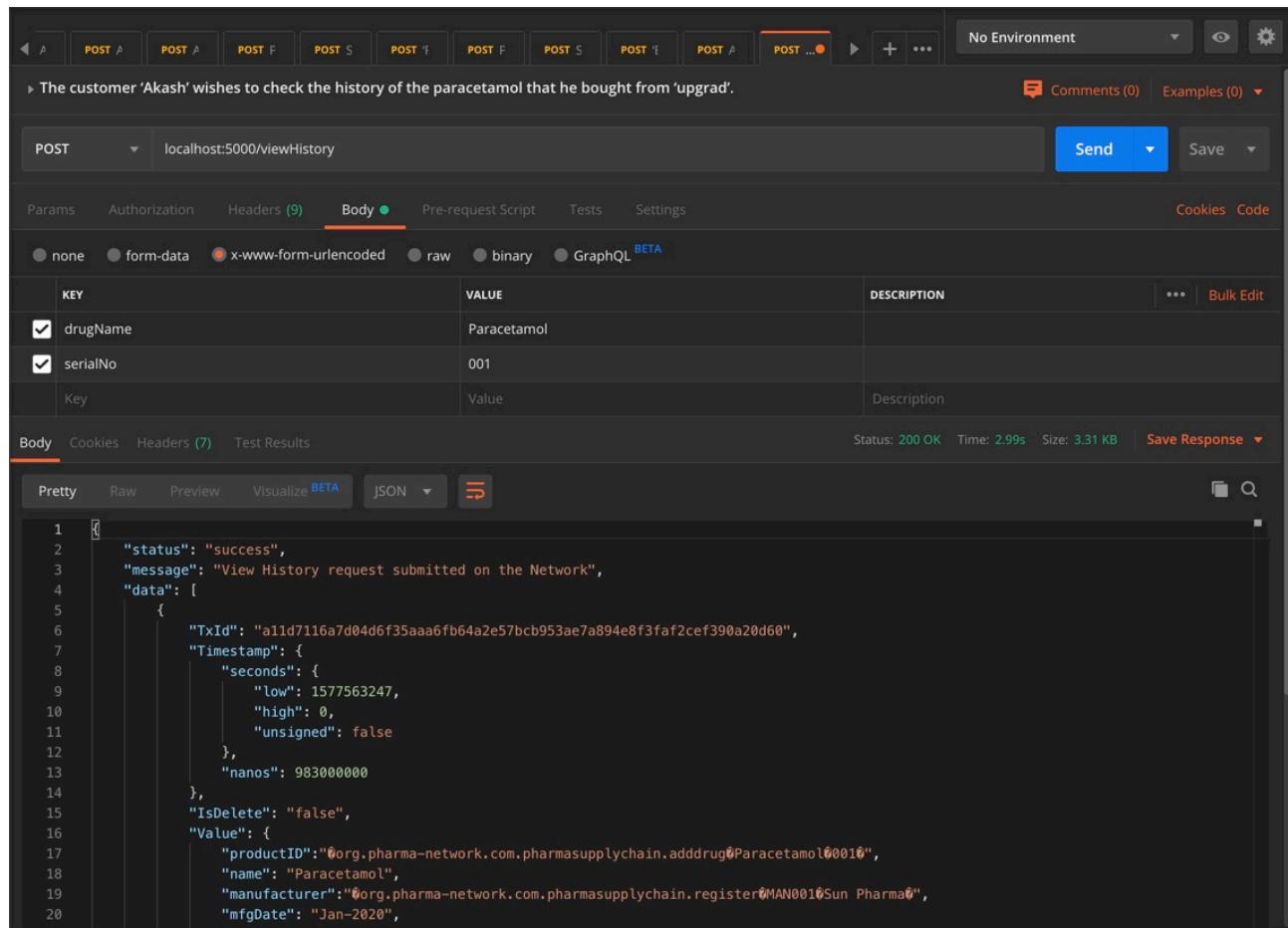
The screenshot shows the Postman application interface. At the top, there is a navigation bar with various POST methods (A, F, S, I, P, AX, T) and an 'No Environment' dropdown. Below the navigation bar, a header bar displays the URL 'localhost:3000/retailDrug' and includes 'Send' and 'Save' buttons. The main workspace is divided into sections: 'Params', 'Authorization', 'Headers (9)', 'Body' (selected), 'Pre-request Script', 'Tests', and 'Settings'. Under 'Body', the 'x-www-form-urlencoded' tab is selected, showing a table with four rows: 'drugName' (Value: Paracetamol), 'serialNo' (Value: 001), 'retailerCRN' (Value: RET002), and 'customerAadhar' (Value: Akash). Below this table is a 'Key' column with a 'Value' row containing 'Description'. At the bottom of the 'Body' section, there are tabs for 'Pretty', 'Raw', 'Preview', 'Visualize BETA', and 'JSON' (selected). The 'JSON' tab displays a JSON response with status 'success', message 'Drug Sell Request submitted on the Network', and data containing product ID, manufacturing date, expiration date, owner, and two shipment details. The status bar at the bottom right indicates 'Status: 200 OK', 'Time: 3.43s', 'Size: 685 B', and 'Save Response'.

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	001	
retailerCRN	RET002	
customerAadhar	Akash	
Key	Value	Description

```
1 [ { "status": "success", "message": "Drug Sell Request submitted on the Network", "data": { "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@001", "mfgDate": "Jan-2020", "expDate": "Dec-2020", "owner": "Akash", "shipment": "org.pharma-network.com.pharmasupplychain.shipment@DIST001@Paracetamol@|org.pharma-network.com.pharmasupplychain.shipment@RET002@Paracetamol@" } } ]
```

## History

1. The customer ‘Akash’ wishes to check the history of the paracetamol that he bought from ‘upgrad’.



The customer 'Akash' wishes to check the history of the paracetamol that he bought from 'upgrad'.

POST localhost:5000/viewHistory

Body (x-www-form-urlencoded)

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	001	
Key	Value	Description

Pretty JSON

```
1 [ { "status": "success", "message": "View History request submitted on the Network", "data": [ { "TxId": "a11d7116a7d04d6f35aaa6fb64a2e57bcb953ae7a894e8f3faf2cef390a20d60", "Timestamp": { "seconds": { "low": 1577563247, "high": 0, "unsigned": false }, "nanos": 983000000 }, "IsDelete": "false", "Value": { "productID": "@org.pharma-network.com.pharmasupplychain.addDrug@Paracetamol@001@", "name": "Paracetamol", "manufacturer": "@org.pharma-network.com.pharmasupplychain.register@MAN001@Sun Pharma@", "mfgDate": "Jan-2020" } } ] }
```

2. The customer ‘Akash’ wishes to check the current state of the paracetamol that he bought from ‘upgrad’.

The customer 'Akash' wishes to check the current state of the paracetamol that he bought from 'upgrad'.

POST localhost:5000/viewDrugCurrentState

Body (x-www-form-urlencoded)

KEY	VALUE	DESCRIPTION
drugName	Paracetamol	
serialNo	001	
Key	Value	Description

Status: 200 OK Time: 3.10s Size: 698 B

```
1 "status": "success",
2 "message": "View Drug CurrentState request submitted on the Network",
3 "data": {
4     "productID": "org.pharma-network.com.pharmasupplychain.adddrug@Paracetamol@001@",
5     "mfgDate": "Jan-2020",
6     "expDate": "Dec-2020",
7     "owner": "Akash",
8     "shipment": "org.pharma-network.com.pharmasupplychain.shipment@DIST001@Paracetamol@|org.pharma-network.com.pharmasupplychain.shipment@RET002@Paracetamol@"
9 }
10 }
```

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